Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

Pediatric asthma: percentage of children, ages 1 through 17 years old, identified as having asthma, regardless of severity, who are prescribed and dispensed a new medication delivery device and have documentation of the child or caregiver receiving education in the proper use of the device.

Source(s)

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC). Basic measure information: education in proper use of new asthma medication delivery device for children with asthma. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 Feb. 39 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Process

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of children, ages 1 through 17 years old, identified as having asthma, regardless of severity, who are prescribed and dispensed a new medication delivery device and have documentation of the child or caregiver receiving education in the proper use of the device.

For the purposes of this measure, education in proper use is defined as documentation of verbal instruction, education and/or demonstration. Asthma may be of any severity; examples of devices include metered-dose inhalers (MDI), dry-powder inhalers (DPI), nebulizers, chambers, and masks. Children must be continuously enrolled in their insurance plan during the measurement year (January through December) and the year prior. A higher proportion indicates better performance, as reflected by appropriate education.

Rationale

Asthma is a chronic respiratory disease characterized by exacerbations that lead to symptoms of coughing, wheezing, and difficulty breathing. Pediatric asthma is the most common chronic disease of childhood and is on the rise, with over 7 million American children currently living with asthma (National Asthma Education and Prevention Program [NEAPP], 2007; Bloom, Cohen, & Freeman, 2012). Asthma is also a leading cause of hospitalizations for children in the United States. In 2007, the disease was responsible for approximately $56 billion in medical costs, as well as days lost from school and work, and early deaths (Centers for Disease Control and Prevention [CDC], 2011).

Clinical practice guidelines for asthma presented in the National Asthma Education and Prevention Plan's Expert Panel Report 3 (EPR-3) (2007) have been developed to direct providers to evidence-based care in an effort to address and improve the quality of care for patients with asthma and to decrease morbidity and mortality in this population. Providing and documenting instruction on the proper use of delivery devices for inhaled medications and making sure patients and providers can demonstrate appropriate technique is a crucial part of guideline-driven asthma self-management education (NEAPP, 2007).

Evidence for Rationale

Bloom B, Cohen RA, Freeman G. Summary health statistics for U.S. Children: National Health Interview Survey, 2011. Vital Health Stat 10. 2012 Dec;(254):1-88. PubMed

Centers for Disease Control and Prevention (CDC). Asthma in the US. [internet]. Atlanta (GA): Centers for Disease Control and Prevention (CDC); 2011 May [accessed 2016 Feb 19].

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Primary Health Components

Asthma; medication delivery device; patient education; children

Denominator Description

The denominator is the number of children, ages 1 through 17 years, identified as having asthma, regardless of severity, who are prescribed and dispensed a new medication delivery device in the measurement year (see the related "Denominator Inclusions/Exclusions" field).

Numerator Description

The numerator is the number of children, ages 1 through 17 years, identified as having asthma, regardless of severity, who are prescribed and dispensed a new medication delivery device and have documentation of the patient or the caregiver(s) receiving education in the proper use of a new medication delivery device in the measurement year (see the related "Numerator Inclusions/Exclusions" field).

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A clinical practice guideline or other peer-reviewed synthesis of the clinical research evidence

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Pediatric Asthma Disease Prevalence and Incidence
Pediatric asthma is the most common chronic disease of childhood and the leading cause of childhood school absences, emergency department visits, and hospitalizations due to chronic illness (Pedersen et al., 2011). The prevalence of pediatric asthma is currently plateaued (Akinbami, Simon, & Rossen, 2016), with approximately 7 million American children under the age of 18 years currently living with asthma (Bloom, Cohen, & Freeman, 2012). Of these 7 million children, 4.1 million have suffered from an asthma attack in the previous 12 months (Centers for Disease Control and Prevention [CDC], National Center for Health Statistics [NCHS], 2011).

Pediatric Asthma Pathology and Severity
Asthma is a chronic disease of the small airways characterized by inflammation and airway hyper-responsiveness, which together lead to bronchoconstriction and mucus plugging (Pedersen et al., 2011). Symptoms of asthma include recurring episodes of wheezing, shortness of breath, chest tightness, and coughing. These episodes, or exacerbations, are typically associated with at least partially reversible airflow obstruction (National Asthma Education and Prevention Program [NAEPP], 2007) and may range in severity from mild to life-threatening (CDC, 2013). The causes of asthma are not fully understood (NAEPP, 2007), but it is thought that multiple host and environmental factors may be involved at critical times in immune development (CDC, 2013). Environmental factors that are common triggers include respiratory viral infections; airborne allergens such as pollens, mold, animal dander, and dust mites; and air pollution, including tobacco smoke. There is no cure for asthma, but it can be controlled with appropriate medical care, medications, and avoidance of triggers (NAEPP, 2007).

Pediatric Asthma Burden in Daily Life
The burden of pediatric asthma on children and families is significant. In 2008 the disease resulted in 14 million missed school days and an estimated $3.8 billion in lost productivity (CDC, 2013). Poorly controlled asthma can affect children's quality of sleep, school performance, and ability to participate in sports and social activities. Asthma deaths are rare, particularly among children and young adults; the majority of deaths due to asthma occur in persons aged 65 years and older. However, children do die from asthma. The CDC reported that in 2011, 169 children younger than 15 years of age died from the disease (CDC, 2014). Asthma deaths are thought to be largely preventable through appropriate care and management.

Pediatric Asthma Disease Cost
Pediatric asthma is one of the most common causes of preventable hospitalization (Kenyon et al., 2015). Although only a small percentage of the nearly 7 million U.S. children with asthma are admitted to the hospital in a given year, asthma is the third leading cause of hospitalization and accounts for nearly one-third of national pediatric asthma costs (Kenyon et al., 2014). Pediatric patients with asthma are seen across the health care spectrum. They account for almost 5 million physician visits (Akinbami & CDC NCHS, 2006), and their average annual prescription drug expenditures have nearly doubled since the 1990s (Sarpong, 2011).

Outcomes of Appropriate Education for Proper Use of New Asthma Medication Delivery Devices

Asthma is a chronic disease that cannot be cured, but it can be controlled through appropriate management (van der Molen et al., 2006). Clinical guidelines outlined in the NAEPP's Expert Panel Report-3 (EPR-3) *Guideline for the Diagnosis and Management of Asthma* (2007) clearly detail steps for diagnosis, classification of disease severity, and appropriate medication management across the lifespan. Inhaled asthma medications are an important aspect of asthma management. The administration of asthma medications through inhalation is advantageous because it allows for direct delivery of medication to the lungs and rapid onset of action, maximizing the desired effects and minimizing potential problems associated with systemic administration (Giraud, Allaert, & Roche, 2011). Inhalers are the most common type of medication devices used in asthma treatment; however, there are many asthma medication delivery devices, each requiring different handling and inhalation techniques.

Children have anatomic and physiologic differences that may alter deposition of the medication into the lungs. These characteristics include lower tidal volume (the volume of air inhaled and exhaled during a normal breath) and highly variable breathing patterns (Kwok & Chan, 2014). Asthma medication delivery can be further complicated in the pediatric population when medication has to be administered to uncooperative children (Goralski & Davis, 2014). These difficulties make correct inhalation technique vital, as decreased medication delivery to the lungs results in little or no therapeutic benefit from the treatment. Poor inhalation technique leads to poor asthma control, followed by an increased risk of exacerbations and adverse effects. It is estimated that between 70% and 80% of patients do not use their inhaler correctly ("Global strategy for asthma," 2014). Understanding device technique is particularly important for young children and their caregivers, as younger patients often need adult help administering their asthma treatments (Reznik, Silver, & Cao, 2014).

Instructing patients and caregivers on the proper use of a newly prescribed asthma delivery device is a crucial part of the guideline-based asthma self-management education recommendations that support appropriate care (NAEPP, 2007; "Global strategy for asthma," 2014); having patients or caregivers demonstrate appropriate device technique is also important. Guidelines recommend that clinicians demonstrate, review, evaluate, and correct inhalation technique at each visit, because the skills necessary to take asthma medication appropriately deteriorate quickly (NAEPP, 2007; "Global strategy for asthma," 2014). If followed, this teaching process leads to improved control, decreased risk of exacerbations and adverse effects ("Global strategy for asthma," 2014), fewer urgent care visits and hospitalizations, reduced asthma-related health care costs, and improved health (NAEPP, 2007). In particular, correct use of inhalation devices by children and adolescents is associated with improved lung function, reduced school absenteeism, decreased number of days with restricted activities, and fewer visits to emergency departments (Inhaler Error Steering Committee et al., 2013).

This measure assesses the percentage of children, ages 1 through 17 years old identified as having asthma, regardless of severity, who are prescribed a new medication delivery device and have documentation of the patient or caregiver(s) receiving instruction or demonstration in the proper use of that device. A higher proportion indicates better performance, as reflected by appropriate instruction and use.

Performance Gap

Despite the availability of a wide range of controller medications, many patients have asthma that is poorly controlled (Wechsler, 2014). Factors affecting asthma control include patient adherence issues, health care disparities, and provider prescribing practices. However, even when the medication is in the hands of the patient, there are still barriers to getting it to the lungs. Having an appropriate mechanism for the effective delivery of medication is crucial, regardless of the age of a child. Using an inhaler is a skill that must be learned and maintained in order for medication to be delivered effectively ("Global strategy for asthma," 2014). Additionally, inhaled asthma medicines are available in a variety of formats (metered-dose inhaler [MDI], dry-power inhaler [DPI], nebulizer) that involve different delivery devices and differing inhalation techniques. This is often confusing for patients. Confusion leads to incorrect use; bad technique results in poorly controlled asthma and higher costs, either as a result of increased morbidity or increased use of relief medication (Inhaler Error Steering Committee et al., 2013).

Despite tremendous advancements in aerosolized medication technology that have permitted the introduction of more user-friendly devices, studies have shown that inhaler mishandling remains a serious issue for products currently available (Melani et al., 2011). Technique failure occurs at both the patient and provider level. Sleath and colleagues (2011) demonstrated that only 8.1% of children performed all of the metered dose inhaler steps correctly, only 22% performed all of the Diskus® (one type of DPI device) steps correctly, and only 15.6% performed all of the Turbuhaler® (a different type of DPI device) steps correctly. The perceived complexity of inhaled medications may lead to discontinuation of the medication, which will further erode asthma control (Chorão, Pereira, & Fonseca, 2014).

As for providers, research has shown that clinicians often do not demonstrate or assess inhaler use during pediatric asthma visits (Sleath et al., 2011). Only 15% to 69% of health care professionals (across all disciplines) are able to demonstrate correct inhaler use, and the proportion who review inhaler technique over time is even smaller (Inhaler Error Steering Committee et al., 2013). In a study by Reznik, Silver, & Cao (2014), 85% of caregivers of children with asthma recalled a physician or nurse demonstrating MDI-spacer technique, but only 54% said the provider asked them to show back how they would use the device.

Poor asthma control, whether from adherence issues or improper device technique, leads to increased rates of emergency department visits and hospitalizations, greater health care utilization, and decreased quality of life (Reznik, Jaramillo, & Wylie-Rosett, 2014). Assessing whether children with asthma receive instruction in proper use of their asthma medication devices and whether they can demonstrate correct use will support efforts to improve asthma control in the pediatric population.

Evidence for Additional Information Supporting Need for the Measure

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Pedersen SE, Hurd SS, Lemanske RF, Becker A, Zar HJ, Sly PD, Soto-Quiroz M, Wong G, Bateman ED, Global Initiative for Asthma. Global strategy for the diagnosis and management of asthma in children 5 years and younger. Pediatr Pulmonol. 2011 Jan;46(1):1-17. PubMed

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Extent of Measure Testing

Reliability

Medical Record Abstraction. Medical record data were obtained through HealthCore, Inc., for the measurement year of 2013. HealthCore is an independent subsidiary of Anthem, Inc., the largest health benefits company/insurer in the United States. HealthCore owns and operates the HealthCore Integrated Research Database (HIRD), a longitudinal database of medical and pharmacy claims and enrollment information for members from 14 geographically diverse Blue Cross and/or Blue Shield Health Plans in the Northeast, South, West, and Central regions of the United States, with members living in all 50 states. In total, the HIRD includes approximately 60 million insured individuals between January 2006 and June 2014.

Approximately 205,000 children, ages newborn through 17 years old, with an asthma diagnosis and/or symptoms were identified in the HIRD in 2012 (the year prior to the measurement year, per measure specification). Of these, a cohort of 649 children were identified who had a new medication delivery device dispensed in 2013 and met the additional inclusion/exclusion criteria for this measure. A stratified random sample (SRS) of charts was requested from provider offices and health care facilities, with a target of obtaining at least 135 completed records.

Patient medical records were sent to a centralized location for data abstraction. Trained medical record abstractors collected and entered information from paper copies of both electronic and paper medical records into a password protected database. To help ensure consistency of data collection, the medical record abstractors were trained on the study's design and presented with a standardized data collection form designed to minimize the need to make subjective judgments during the abstraction process. In addition, data entered onto a scanner form and subsequently scanned was reviewed through a series of quality checks.

In total, 177 charts were reviewed. Chart review indicated that among these 177 children who were dispensed a new medication delivery device, evidence of prescription of the new medication delivery device was present in 118 charts. Furthermore, children who turned 18 years of age during the measurement year were excluded, resulting in a final chart population of 116 children with asthma who were prescribed and dispensed a new medication delivery device. Among the 116 children eligible for the denominator, 94 (81%) had a diagnosis of asthma recorded in the medical record for the measurement year. A total of 28 (24.1%) children had documentation of either the child or caregiver(s) receiving education in proper use of the device.

Inter-Rater Reliability (IRR). Reliability of medical record data was determined through re-abstraction of patient record data to calculate the IRR between abstractors. Broadly, IRR is the extent to which the abstracted information is collected in a consistent manner. Low IRR may be a sign of poorly executed abstraction procedures, such as ambiguous wording in the data collection tool, inadequate abstractor training, or abstractor fatigue. IRR was determined by calculating percent agreement. Any differences were remedied by review of the chart. IRR was determined by calculating both percent agreement and Cohen's kappa statistic.

IRR Results. Of the 118 records abstracted for this measure, 7 (4%) were reviewed for IRR. IRR was assessed by comparing abstractor agreement with a senior abstractor on data elements that could be abstracted for this measure. Overall, abstractor agreement was 100%; the kappa statistic was 1.0, indicating that a perfect level of IRR was achieved. Given this evidence, the data elements needed for calculation of the measure can be abstracted from medical records with a high degree of accuracy.

Validity

Face Validity. The face validity of this measure was established by a national panel of experts and parent representatives for families of children with asthma convened by Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC). The Q-METRIC panel included nationally recognized experts in asthma, representing the areas of general pediatrics, family practice, pediatric pulmonology, allergy, pediatric hospitalist, asthma education (including certified asthma educators), and general and pediatric emergency medicine. In addition, measure validity was considered by experts in state Medicaid program operations, health plan quality measurement, health informatics, and health care quality measurement. In total, the Q-METRIC asthma panel included 16 experts, providing a comprehensive perspective on asthma care and the measurement of quality metrics for states and health plans.

The Q-METRIC expert panel concluded that this measure has a high degree of face validity through a detailed review of concepts and metrics considered to be essential to effective asthma management and treatment. Concepts and draft measures were rated by this group for their relative importance. This measure was very highly rated, receiving an average score of 7.8 (with 9 as the highest possible score).

The Importance of Abstracted Medical Record Data. This measure is specified using medical record data after administrative claims were used to identify the eligible population. Medical records are considered the gold standard for clinical information; findings indicate that these data have a high degree of face validity and reliability, as summarized above. As both the prescription of a new medication delivery device and education in the proper use of a new medication delivery device cannot be identified using claims, it is necessary to identify this criteria within medical records in order to accurately assess the proportion of children with asthma and a new delivery device who are receiving this integral education. As a consequence, implementing this measure solely upon administrative claims data would not be possible, and abstraction of medical records is necessary.

Refer to the original measure documentation for additional information.

Evidence for Extent of Measure Testing

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC). Basic measure information: education in proper use of new asthma medication delivery device for children with asthma. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 Feb. 39 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Ambulatory/Office-based Care

Managed Care Plans

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Specified

Target Population Age

Age 1 to 17 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Person- and Family-centered Care
Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Data Collection for the Measure

Case Finding Period

The measurement year (January 1 through December 31)

Denominator Sampling Frame

Enrollees or beneficiaries

Denominator (Index) Event or Characteristic

Clinical Condition

Patient/Individual (Consumer) Characteristic

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

The denominator is the number of children, ages 1 through 17 years, identified as having asthma, regardless of severity, who are prescribed and dispensed a new medication delivery device in the measurement year.

Note:

> The eligible population includes children who are 1 year old or older on January 1 of the measurement year but younger than 18 years on December 31 of that year. Children must be continuously enrolled in their insurance plan during both the measurement year and the year prior.
> Children with asthma of any severity are identified using the asthma diagnosis codes listed in Table 1 of the original measure documentation. The asthma diagnosis must occur within the year prior to the measurement year.
> For inhaled medications (refer to the Appendix of the original measure documentation for list of drug devices), a new medication delivery device is considered to be any device that is prescribed and dispensed within the measurement year that was neither dispensed earlier in the measurement year or in the year prior to the measurement year. Dispensed delivery devices are identified using pharmacy administrative claims. The devices are verified as newly-prescribed in the measurement year using medical records. A first-time prescribed and dispensed metered-dose inhalers (MDI) is one example; another would be changing from a nebulizer to a dry-powder inhalers (DPI) delivery format.

Exclusions

> Children with a diagnosis during the measurement year or the year prior to the measurement year indicating cystic fibrosis or bronchiectasis (refer to Table 2 of the original measure documentation)
> Children who are younger than 6 years old and have a diagnosis during the measurement year or the year prior to the measurement year indicating bronchopulmonary dysplasia, tracheomalacia, or bronchomalacia (refer to Table 2 of the original measure documentation)
> Children who are 6 years or older and have a diagnosis during the measurement year or the year prior to the measurement year indicating bronchopulmonary dysplasia, tracheomalacia, or bronchomalacia (refer to Table 2 of the original measure documentation), unless there is also a diagnosis for an asthma variant listed in Table 1 of the original measure documentation

Children with a diagnosis indicating "exercise induced bronchospasm" (refer to Table 2 of the original measure documentation), *unless* there is also a diagnosis for an asthma variant listed in Table 1 of the original measure documentation

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions
The numerator is the number of children, ages 1 through 17 years, identified as having asthma, regardless of severity, who are prescribed and dispensed a new medication delivery device and have documentation of the patient or the caregiver(s) receiving education in the proper use of a new medication delivery device in the measurement year.

Note: Education on proper use may include notes indicating verbal instruction, education and/or demonstration.

Exclusions
Unspecified

Numerator Search Strategy

Fixed time period or point in time

Data Source

Administrative clinical data

Electronic health/medical record

Paper medical record

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a higher score

Allowance for Patient or Population Factors

not defined yet

Standard of Comparison

not defined yet

Identifying Information

Original Title

Education in proper use of new asthma medication delivery device for children with asthma.

Measure Collection Name

Pediatric Asthma Measures

Submitter

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) - Academic Affiliated Research Institute

Developer

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Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2016 Feb

Measure Maintenance

Unspecified

Date of Next Anticipated Revision

Unspecified

Measure Status

This is the current release of the measure.

Measure Availability

Source available from the Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC) Web site. Support documents also available from the Q-METRIC Web site.

For more information, contact Q-METRIC at 300 North Ingalls Street, Room 6C06, SPC 5456, Ann Arbor, MI 48109-5456; Phone: 734-232-0657.

NQMC Status

This NQMC summary was completed by ECRI Institute on May 9, 2016. The information was verified by the measure developer on June 10, 2016.

Copyright Statement

Production

Source(s)

Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC). Basic measure information: education in proper use of new asthma medication delivery device for children with asthma. Ann Arbor (MI): Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC); 2016 Feb. 39 p.

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